

**National Exposure Research Laboratory
Research Abstract**

GPRA Goal 2 - (Clean and Safe Water)
FY 2004 Annual Performance Measure (APM) #252

Significant Research Findings:

**Association among invertebrates and habitat
indicators for large rivers in the Midwest**

**How sampling distance, point-sampling of habitat, and subsample size
affect measures of large river macroinvertebrate assemblages**

**Scientific
Problem and
Policy Issues**

Wadeable streams and smaller rivers are abundant and relatively easy to sample compared to large rivers. As a result, efforts to develop appropriate sampling protocols for the bioassessment of lotic (running water) ecosystems have been focused largely on smaller systems. As these methods become increasingly refined and accepted, a growing number of government agencies are starting to better understand and develop sampling protocols for non-wadeable large rivers. Large rivers differ from wadeable systems in some important ways. For example, communities in large rivers may be very different from those in smaller systems. In addition, the deepest part of the channel of a large river often may not be accessible for sampling as it is in wadeable streams, precluding the use of some wadeable stream sampling protocols. Hence, resource managers need clear and consistent protocols available for measuring ecological integrity that are designed specifically for large river systems.

**Research
Approach**

Large river sites in the Midwest were sampled using a prototype benthic macroinvertebrate sampling technique. The intent was to better understand the relationship between large river macroinvertebrate assemblages and habitat features. This information was to determine an acceptable sampling design to support development of a large river bioassessment protocol (LR-BP). Specific objectives included determining the appropriate number of habitat point-samples to be collected, examining how varying reach length affects assemblage characteristics, and determining an appropriate laboratory subsample size to accompany the resulting field sampling method.

**Results and
Impact**

This research indicated that, using the sampling technique proposed in this study, a representative sample of the benthic macroinvertebrate fauna in the study reaches was collected by sampling both banks of 6 transects spaced at 100 m intervals over a 500-m distance. These results were likely achieved because the sampling method and design effectively sampled the benthic macroinvertebrate fauna of the dominant habitat types within the reach. The field method should be coupled with a fixed laboratory subsample size of 300 organisms for bioassessment purposes. This recommendation is based on the response of the tested metrics, and the observation that the ability to separate sites of different macroinvertebrate

composition generally did not significantly improve with larger subsample sizes.

With development of this standardized method, regulatory agencies responsible for protecting and restoring water quality have a new tool for determining the condition of large rivers. The method is already in use as the standardized approach for a region-wide Regional Methods project in Region 5. The method has also been adopted as the standard method and is in-use by the Huntington District of the U.S. Army Corps of Engineers for bioassessment of waters within their jurisdiction, and by the states of Mississippi and Kentucky for conducting state-wide water quality assessments. Additional applications of the method are pending for 2005.

**Research
Collaboration and
Research
Products**

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For a listing of recent publication, presentation, and workshops on this and related research, please consult the contact information below.

Future Research

Upon completion of this effort, a project was initiated to determine the *in-field* and *laboratory* performance characteristics of the newly-developed method. These results will be the focus of a report that will be available fall 2005.

**Contacts for
Additional
Information**

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